

WHAT IS CLAIMED IS:

1. A document inverting-and-transporting apparatus
which is to be mounted on an image reading apparatus
5 having a reading unit which reads an image of a document
at a reading position, the document inverting-and-
transporting apparatus comprising:
 - a transport path including:
 - a first route along which the document is
10 transported from a feeding start position to a
transport direction changing position; - a joining position; and
the reading position, wherein the joining
position and the reading position are located in
15 the first route in a sequence along a document
transport direction;
 - an inversion-and-transport path including a second
route along which the document is transported from the
transport direction changing position to the reading
20 position via the joining position;
 - a document transporting unit which transports the
document;
 - a closed portion which constitutes a part of the
inversion-and-transport path;
 - 25 a document length detecting unit which detects a

length of the document before the document is transported from the transport direction changing position to the inversion-and-transport path;

5 a first comparing unit which compares the detected length of the document with a predetermined length which is larger than a length of the closed portion; and

10 a controlling unit which, determines whether the document is to be transported to the inversion-and-transport path or not on the basis of a result of the comparison by the first comparing unit and controls the document transporting unit on the basis of the determination.

2. The document inverting-and-transporting
15 apparatus according to claim 1, wherein the closed portion corresponds to a part of the second route, the part elongating from the transport direction changing position to the joining position without passing the reading position.

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3. The document inverting-and-transporting apparatus according to claim 1, wherein a document discharging portion, which discharges the document, is disposed at the transport direction changing position.

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4. The document inverting-and-transporting apparatus according to claim 2, further comprising:

a cover member which covers the transport path swingably and, when opened, allows the joining position to be exposed, wherein:

the first comparing unit compares the predetermined length $(L_1 + \alpha)$ with L , where L_1 denotes a length of the closed portion and α denotes a depth dimension enabling the document to be picked out; and

when the result of the comparison by the first comparing unit is $L \geq (L_1 + \alpha)$, the controlling unit controls the document transporting unit to transport the document to the inversion-and-transport path.

5. The document inverting-and-transporting apparatus according to claim 4, wherein when the result of the comparison by the first comparing unit is $L < (L_1 + \alpha)$, the controlling unit controls the document transporting unit to discharge the document to an outside of the document inverting-and-transporting apparatus without transporting the document to the inversion-and-transport path.

6. The document inverting-and-transporting apparatus according to claim 5, wherein after both

surfaces of the document are read at the reading position, the controlling unit controls the transporting unit to discharge the document to the outside.

5 7. The document inverting-and-transporting apparatus according to claim 2, further comprising:

 a cover member which covers the transport path swingably and, when opened, allows the joining position to be exposed; and

10 a reading opening which is defined at the reading position to enable the reading unit to read an image of the document, wherein:

 the first comparing unit compares the predetermined length $(L2 + \alpha)$ with L , where $L2$ denotes a length from the transport direction changing position to the reading opening via the joining position and α denotes a depth dimension enabling the document to be picked out; and

 when the result of the comparison by the first comparing unit is $L \geq (L2 + \alpha)$, the controlling unit controls the document transporting unit to transport the document to the inversion-and-transport path.

 8. The document inverting-and-transporting apparatus according to claim 7, wherein when the result of the comparison by the first comparing unit is $L < (L2 +$

α), the controlling unit controls the document transporting unit to discharge the document to an outside of the document inverting-and-transporting apparatus without transporting the document to the inversion-and-transport path.

9. The document inverting-and-transporting apparatus according to claim 8, wherein after both surfaces of the document are read at the reading position, the controlling unit controls the transporting unit to discharge the document to the outside.

10. The document inverting-and-transporting apparatus according to claim 1, further comprising:
a reading opening which is defined at the reading position to enable the reading unit to read an image of the document, wherein:
the closed portion corresponds to a part of the second route, the part elongating from the transport direction changing position to the reading opening via the joining position.

11. The document inverting-and-transporting apparatus according to claim 10, wherein
the first comparing unit compares the predetermined

length ($L2 + \alpha$) with L , where $L2$ denotes a length from the transport direction changing position to the reading position via the joining position and α denotes a depth dimension enabling the document to be picked out; and

5 when the result of the comparison by the first comparing unit is $L \geq (L2 + \alpha)$, the controlling unit controls the document transporting unit to transport the document to the inversion-and-transport path.

10 12. The document inverting-and-transporting apparatus according to claim 11, wherein when the result of the comparison by the first comparing unit is $L < (L2 + \alpha)$, the controlling unit controls the document transporting unit to discharge the document to an outside
15 of the document inverting-and-transporting apparatus without transporting the document to the inversion-and-transport path.

20 13. The document inverting-and-transporting apparatus according to claim 12, wherein after both surfaces of the document are read at the reading position, the controlling unit controls the transporting unit to discharge the document to the outside via the discharging portion.

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14. The document inverting-and-transporting apparatus according to claim 1, further comprising:

a document detecting unit which is disposed downstream of the joining position in the document transport direction, and detects whether the document exists or not;

a second comparing unit which compares L3 with L4 where L3 denotes a length from the transport direction changing position to the document detecting unit via the joining position and L4 denotes a transport distance by which the document transporting unit transports the document from the transport direction changing position into the inversion-and-transport path; and

a determining unit which, on the basis of a result of the comparison by the second comparing unit, determines whether a jam occurs in the inversion-and-transport path or not.

15. The document inverting-and-transporting apparatus according to claim 13, wherein, if the document detecting unit detects that the document does not exist although the result of the comparison by the second comparing unit is $L4 > L3$, the determining unit determines that the jam occurs in the inversion-and-transport path.

16. The document inverting-and-transporting apparatus according to claim 15, wherein after both surfaces of the document are read at the reading position, the controlling unit controls the transporting unit to
5 discharge the document to the outside.

17 The document inverting-and-transporting apparatus according to claim 14, wherein the document detecting unit is disposed between the joining position
10 and the reading position.

18. The document inverting-and-transporting apparatus according to claim 17, wherein the document length detecting unit and the document detecting unit are
15 configured by a common sensor.

19. The document inverting-and-transporting apparatus according to claim 1, further comprising:

a document detecting unit which is disposed
20 downstream of the joining position in the document transport direction, and detects whether the document exists or not;

a second comparing unit which compares $(L3 + \beta)$ with $L4$ where $L3$ denotes a length from the transport direction
25 changing position to the document detecting unit via the

joining position; L_4 denotes a transport distance by which
the document transporting unit transports the document
from the transport direction changing position into the
inversion-and-transport path; and β denotes a
5 predetermined length for determination of jam; and

a determining unit which, on the basis of a result of
the comparison by the second comparing unit, determines
whether the jam occurs in the inversion-and-transport path
or not.

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20. The document inverting-and-transporting
apparatus according to claim 19, wherein if the document
detecting unit detects that the document does not exist
although the result of the comparison by the second
15 comparing unit is $L_4 > (L_3 + \beta)$, the determining unit
determines that the jam occurs in the inversion-and-
transport path.

21. The document inverting-and-transporting
20 apparatus according to claim 20, wherein after both
surfaces of the document are read at the reading position,
the controlling unit controls the transporting unit to
discharge the document to an outside of the document
inverting-and-transporting apparatus.

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22 The document inverting-and-transporting
apparatus according to claim 19, wherein the document
detecting unit is disposed between the joining position
and the reading position.

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23. The document inverting-and-transporting
apparatus according to claim 22, wherein the document
length-detecting unit and the document detecting unit are
configured by a common sensor.

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24. The document inverting-and-transporting
apparatus according to claim 1, further comprising:

a document detecting unit which is disposed
downstream of the joining position in the document
transport direction, and detects a front end of the
document and a rear end of the document;

a second comparing unit which compares $(L3 + \beta)$ with
 $L4 + (\gamma - \delta)$ where $L3$ denotes a length from the transport
direction changing position to the document detecting unit
via the joining position; $L4$ denotes a transport distance
by which the document transporting unit transports the
document from the transport direction changing position
into the inversion-and-transport path; β denotes a
predetermined length for determination of jam; γ denotes a
length from a rear detection position where the document

detecting unit detects the rear end of the document to the transport direction changing position; and δ denotes a transport distance from a timing when the document detecting unit detects the rear end of the document to a timing when the transporting unit once stops transporting the document; and

a determining unit which, on the basis of a result of the comparison by the second comparing unit, determines whether the jam occurs in the inversion-and-transport path or not.

25. The document inverting-and-transporting apparatus according to claim 24, wherein if the document detecting unit detects that a document does not exist although the result of the comparison by the second comparing unit is $L4 + (\gamma - \delta) > (L3 + \beta)$, the determining unit determines that the jam occurs in the inversion-and-transport path.

26. The document inverting-and-transporting apparatus according to claim 25, wherein after both surfaces of the document are read at the reading position, the controlling unit controls the transporting unit to discharge the document to an outside of the document inverting-and-transporting apparatus.

27 The document inverting-and-transporting
apparatus according to claim 24, wherein the document
detecting unit is disposed between the joining position
5 and the reading position.

28. The document inverting-and-transporting
apparatus according to claim 27, wherein the document
length detecting unit and the document detecting unit are
10 configured by a common sensor.

29. A document inverting-and-transporting apparatus
comprising:

a transporting unit which transports a document;
15 a transport path including a joining position, a
reading position where the document is read by a reading
unit, and a transport direction changing position where
the transporting unit changes a transport direction of the
document;

20 an inversion-and-transport path between the transport
direction changing position and the joining position
without including the reading position;

a document length detecting unit which detects a
length of the document;

25 a first comparing unit which compares the detected

length of the document with a predetermined length which is equal to or larger than a length between the joining position and the document direction changing position; and

a controlling unit which, determines whether the document is to be transported to the inversion-and-transport path or not on the basis of a result of the comparison by the first comparing unit and controls the document transporting unit on the basis of the determination.

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30. The document inverting-and-transporting apparatus according to claim 29, wherein:

the predetermined length is $L_1 + \alpha$, where L_1 denotes the length between the joining position and the document direction changing position and α denotes a depth dimension enabling the document to be picked out;

when the result of the comparison by the first comparing unit is $L \geq (L_1 + \alpha)$, the controlling unit controls the document transporting unit to transport the document to the inversion-and-transport path; and

when the result of the comparison by the first comparing unit is $L < (L_1 + \alpha)$, the controlling unit controls the document transporting unit to discharge the document to an outside of the document inverting-and-transporting apparatus without transporting the document

to the inversion-and-transport path.

31. The document inverting-and-transporting apparatus according to claim 29, further comprising:

5 a reading opening which is defined at the reading position to enable the reading unit to read an image of the document, wherein:

the predetermined length is $L2 + \alpha$, where $L2$ denotes a length from the transport direction changing position to the reading opening via the joining position and α denotes
10 a depth dimension enabling the document to be picked out;

when the result of the comparison by the first comparing unit is $L \geq (L2 + \alpha)$, the controlling unit controls the document transporting unit to transport the
15 document to the inversion-and-transport path; and

when the result of the comparison by the first comparing unit is $L < (L2 + \alpha)$, the controlling unit controls the document transporting unit to discharge the document through the discharging portion to an outside of
20 the document inverting-and-transporting apparatus without transporting the document to the inversion-and-transport path.

32. The document inverting-and-transporting apparatus according to claim 29, further comprising:
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a document detecting unit which is disposed downstream of the joining position in the document transport direction, and detects whether a document exists or not;

5 a second comparing unit which compares L3 with L4 where L3 denotes a length from the transport direction changing position to the document detecting unit via the joining position and L4 denotes a transport distance by which the document transporting unit transports the
10 document from the transport direction changing position into the inversion-and-transport path; and

a determining unit which, on the basis of a result of the comparison by the second comparing unit, determines whether a jam occurs in the inversion-and-transport path
15 or not, wherein:

if the document detecting unit detects that the document does not exist although the result of the comparison by the second comparing unit is $L4 > L3$, the determining unit determines that the jam occurs in the
20 inversion-and-transport path.

33. The document inverting-and-transporting apparatus according to claim 29, further comprising:

a document detecting unit which is disposed
25 downstream of the joining position in the document

transport direction, and detects whether a document exists or not;

a second comparing unit which compares $(L3 + \beta)$ with $L4$ where $L3$ denotes a length from the transport direction changing position to the document detecting unit via the joining position; $L4$ denotes a transport distance by which the document transporting unit transports the document from the transport direction changing position into the inversion-and-transport path; and β denotes a predetermined length for determination of jam; and

a determining unit which, on the basis of a result of the comparison by the second comparing unit, determines whether the jam occurs in the inversion-and-transport path or not, wherein:

if the document detecting unit detects that the document does not exist although the result of the comparison by the second comparing unit is $L4 > (L3 + \beta)$, the determining unit determines that the jam occurs in the inversion-and-transport path.

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34. The document inverting-and-transporting apparatus according to claim 29, further comprising:

a document detecting unit which is disposed downstream of the joining position in the document transport direction, and detects a front end of the

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document and a rear end of the document;

a second comparing unit which compares $(L3 + \beta)$ with $L4 + (\gamma - \delta)$ where $L3$ denotes a length from the transport direction changing position to the document detecting unit via the joining position; $L4$ denotes a transport distance by which the document transporting unit transports the document from the transport direction changing position into the inversion-and-transport path; β denotes a predetermined length for determination of jam; γ denotes a length from a rear detection position where the document detecting unit detects the rear end of the document to the transport direction changing position; and δ denotes a transport distance from a timing when the document detecting unit detects the rear end of the document to a timing when the transporting unit once stops transporting the document; and

a determining unit which, on the basis of a result of the comparison by the second comparing unit, determines whether a jam occurs in the inversion-and-transport path or not, wherein:

if the document detecting unit detects that the document does not exist although the result of the comparison by the second comparing unit is $L4 + (\gamma - \delta) > (L3 + \beta)$, the determining unit determines that the jam occurs in the inversion-and-transport path.